

a small parcel of shells dredged by him and Mr. Crispo, of his ship, in Bass's Straits. Amongst them I was greatly interested to find a fresh living specimen of the *Trigonia acuticostata*, which I described some years ago as one of the most abundant of our Miocene Tertiary species in some localities. The discovery that it still lives, although an excessive rarity in our seas (only the one example being known), will be welcomed by conchologists as well as geologists, from the very small number of living species of *Trigonia* known. This specimen shows, in even greater clearness than the fossil ones, the total distinction of the ribs from those of the hitherto known living species. The nacre of the interior is pearly white.

I have, &c.,

FREDERICK M'COY.

*On the Reproduction of the Diceious Volvox.*

By M. L.-F. HENNEGUY.

Only two species of *Volvox* are known, *Volvox globator*, L. (*V. stellatus*, Ehr.), and *Volvox minor*, Stein: the former is monœcious (*Volvox monoicus*, Cohn); that is to say, the male and female elements are united in the same individual; the second is dicecious (*Volvox dioicus*, Cohn).

Cohn has just published (*Beiträge zur Biologie der Pflanzen*, 1875) a new monograph of the *Volvox monoicus*, in which he describes the reproduction of this species. I have been enabled, on my part, to trace the mode of evolution of the *Volvox dioicus*, and to observe some facts which have not yet been noticed.

Each *Volvox* is a colony (*cœnobium*) formed of small unicellular algæ, furnished with vibratile cilia, and regularly disposed in the thickness of the gelatinous wall of a hollow sphere. There are four kinds of *cœnobia*:—1. Some consist only of vegetative cells enclosing in their interior young *cœnobia*, or daughter-colonies, each one originating by the division and multiplication of a vegetative cell; 2. A large number of these *cœnobia* contain at the same time male elements, or androgonidia, situated in the thickness of the gelatinous wall; 3. Others only present with the vegetative cells some androgonidia, and do not produce daughter-colonies; 4. The female *cœnobia* contain only gynogonidia, or oospheres, placed in the interior of the sphere.

The androgonidia are formed at the expense of a vegetative cell, which acquires a slightly larger volume than the others and divides into parallel segments. Each of these segments is in the form of an elongated cone: its thickest extremity is green; the other, transparent, presents a small red spot and two vibratile cilia. The bundle of antherozoids displays in the antheridium a constant oscillating movement.

The gynogonidia are, in like manner, produced by the differentiation of a vegetative cell. This becomes much more voluminous than the androgonidia, and filled with a large quantity of starch and chlorophyl granules, which give to the oosphere thus formed a deep-green appearance.

At the time of fecundation the bundles of antherozoids are set at liberty by the dissolution of the wall of the antheridium; they move rapidly in the water, and hasten to fix themselves on the female cœnobia. There they break up to allow the antherozoids to fecundate the oospheres; but I have been unable hitherto to observe the moment of their penetration.

After fecundation the oospheres surround themselves with a thick membrane with a double contour, which until then was invisible, and rapidly change colour: from a dark green they become yellowish green, then orange. They then contain a red oily matter and a large quantity of starch. It is this orange colouring which led some observers to believe that there was a third species of *Volvox* (*Volvox aureus*, Ehr.).

The *Volvoes*, male, female, and neuter, seek light, either solar or artificial, and keep near the surface of the water. As soon as the female cœnobia are fecundated and the oospores change colour, they are seen to avoid the light and to depart from the surface of the water. It is easy to observe this phenomenon in a glass pan or in a watch-glass; the green *Volvoes* stay on the light side, the others on the diametrically opposite. If the glass is turned they change places respectively; and this transfer is effected in a very short time. The *Volvoes* with orange oospores move much more rapidly from the light than the others towards it. The displacement of the *Volvoes* is owing, as is well known, to the movement of the two vibratile cilia with which each vegetative cell is provided, and which project beyond the gelatinous sphere. No change of colour or form can be observed in these cells after fecundation; we are therefore led to think that it is by a sort of attraction exerted on the green matter that the *Volvoes* are drawn towards the light, and that it is by a sort of repulsion exerted on the red matter of the fecundated gynogonidia that these same *Volvoes* afterwards seek obscurity.

When the *Volvoes* begin to appear in the waters where they are found, scarcely any but neuter cœnobia are met with—that is to say, cœnobia enclosing only vegetative cells giving birth by segmentation to daughter-colonies. When some time has passed the number of daughter-colonies contained in each cœnobium diminishes; but there then appear in many *Volvoes* some androgonidia, which represent abortive daughter-colonies. At this moment we only find a few female *Volvoes* not containing any daughter-colonies. When the *Volvoes* have thus reproduced themselves for a certain time by daughter-colonies, the number of female cœnobia is increased, and, some exclusively male cœnobia, destitute of daughter-colonies, appear, while the neuter cœnobia become very rare.

It results from these facts that during a certain period the *Volvox* is multiplied by asexual generation, by scissiparity of a vegetative cell, which by successive segmentations produces a colony of individuals similar to the mother-colony to which this cell belonged. But a time comes when the vegetative cell no longer possesses the property of reproducing itself thus; it can still divide into segments, and give birth to a colony of little cells which acquire a sexual character; that is to say, they are incapable of living separately

and of reproducing themselves. This abortive daughter-colony constitutes the male element, endowed with movement and still enjoying a certain activity. Soon the vegetative cell becomes incapable of segmenting; it can only increase in volume: it is the female element deprived of motion, which requires, in order to reproduce itself, to fuse with the male element.

Sexuality in *Volvox* appears then by degrees, the male sex appearing before the female sex as fast as the species exhausts itself by asexual reproduction.

We must compare this fact with what takes place in the animal kingdom in the animals which are reproduced by parthenogenesis. Professor Balbiani has observed that certain Aphides and the *Phylloxera* degenerate when they are reproduced during a certain time by parthenogenesis; their genital and digestive organs tend to become atrophied. There is a time when the parthenogenetic individuals thus degraded give origin first to male individuals, then to female individuals, which require to be fecundated to reproduce new parthenogenetic individuals.—*Comptes Rendus*, July 24, 1876, p. 287.

*On the Fur-Seal of the Islands of St. Paul and Amsterdam.*

By Prof. W. PETERS.

Last year (*Monatsberichte*, 1875, p. 393) I had the honour of making a communication to the Academy upon a fur-seal from Kerguelen's Land which constitutes a species with a peculiar cranial structure. It was described from a complete young female specimen and the skin of an adult male. I remarked that unfortunately there was no skull with the latter; but I had the less doubt as to its belonging to the same species, as the coloration was similar and the place of origin appeared to be the same, seeing that it was packed in the same vessel with sea-elephants from Kerguelen's Land without any special note. Nevertheless, from a communication made to me by Dr. Studer since his return, there has been an error in this respect, inasmuch as the skin of the male animal originates not from Kerguelen's Land, but from St. Paul or Amsterdam Island. It now became of the greatest importance to me to ascertain by the examination of the skull whether this species agrees with that from Kerguelen's Land, or with the *Otaria Forsteri* of New Zealand, which has lately been carefully investigated by Mr. Clark, of Cambridge. By the great kindness of Prof. Milne-Edwards I have been enabled to make this examination; and it appears therefrom that the fur-seal of St. Paul and Amsterdam agrees neither with *O. gazella* from Kerguelen's Land, nor with *O. Forsteri* of New Zealand, at least so far as can be ascertained by comparison with the figure and description of the skull of the latter. The fur-seal of St. Paul and Amsterdam is quite different in colour from *O. Forsteri*; and in its cranial structure it seems to be intermediate between this and *O. gazella*. I therefore propose for the fine eared seal of St. Paul and Amsterdam the name of *Otaria (Arctophoca) elegans*, and will venture shortly to make a more detailed communication upon this subject.—*Monatsber. der k. preuss. Akad. der Wiss. zu Berlin*, May 1876, p. 316.